

Richmond Refinery LPS Bulletin –Reliability Butamer - Catalyst Deactivation (7/25/2011)



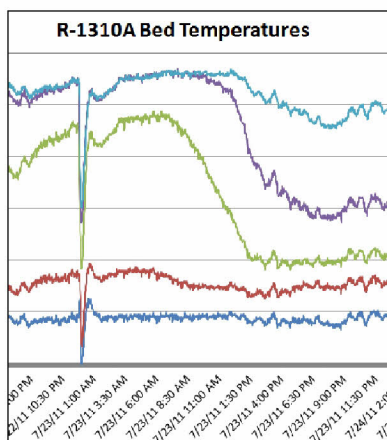
IMPACT ERM#: 19272

Location:
**Butamer, Cracking
Division**

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Trend of the temperatures across the reactor bed used by PED to determine that the catalyst activity was lost. The large dip preceding the event is a routine feed drier swap.

Tenets of Operations Violated:

- 1) 06-Maintain integrity of dedicated systems
- 2) 08-Address abnormal conditions

Incident Description:

On July 25th, PED determined that some reactor activity was lost in the reactor, R-1310A. It was recommended that the plant be shutdown to eliminate any further feed related poisoning to the catalyst. All possible feed streams going to the plant were sampled to identify the source of the contamination, however, no contaminants were detected during this process.

On July 28th at ~6:30pm, feed was established through only the lead reactor to protect from any undetected contaminants from hitting the lag reactor, which still contained healthy catalyst. In addition, the feed temperature was increased and the H₂ rate was increased to give any temporary poisons a chance to be liberated. The first reactor was restarted and reactor activity was restored by the end of the following day. Samples were then taken on the offgas and sulfur was found (note: sulfur acts as a temporary poison to the catalyst). The second reactor was placed back online August 1 and operation returned to normal. This event resulted in an ~4 days loss of Butamer Iso production (~\$100K/day).

Investigation Findings:

- 1) Loss of reaction across individual TIs along the reactor bed was not noticed because overall dT of the reactor did not change quickly or significantly in one shift.
- 2) There were no functioning moisture or sulfur analyzers that would have given a preliminary indication that sulfur or water were breaking through to the contaminate reactors
- 3) Contamination had gotten into the feed unnoticed and reactor bed dTs had no alarms to tell CBO of the contamination

Lessons Learned / Business Practices:

- 1) Properly functioning analyzers could have warned CBO of contaminants
- 2) Rate of change alarms monitoring dT and overall dT low limit alarm are needed to notify operations of any reactor bed changes

What Worked Well:

- 1) PED monitoring of reactor bed temperatures/catalyst activity

Recommendations:

- 1) Improve and/or replace moisture and sulfur analyzers and sample the system to enable reliable detection of contaminants before deactivation of the catalyst occurs
- 2) Add rate of change alarms to reactor dT monitoring on control board for operations to notify of potential deactivation

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